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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/572,668

09/27/2006

Daniele Fauroux

Serie 6373

4615

40582

7590

10/31/2007

AIR LIQUIDE

Intellectual Property

2700 POST OAK BOULEVARD, SUITE 1800

HOUSTON, TX 77056

EXAMINER

PARSA, JAFAR F

ART UNIT

PAPER NUMBER

1621

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/572,668	FAUROUX, DANIELE	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jafar Parsa	1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 September 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9-16 is/are pending in the application.
- 4a) Of the above claim(s) 13-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/27/2006</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Election/Restrictions*

Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 9-12, drawn to a process for producing carbon monoxide by cryogenic distillation.

Group II, claim(s) 13-16, drawn to an installation for producing carbon monoxide by cryogenic distillation.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the process for producing carbon monoxide by cryogenic distillation is well known in the art by cooling and partial condensation of hydrogen, carbon monoxide and methane and separating the mixture by using a stripping and rectification columns. See DE 19541339. Therefore, there is no special technical features that links the two inventions together.

During a telephone conversation with Mr. Haynes on 10/26/2007 a provisional election was made without traverse to prosecute the invention of Group I, claims 9-12.

Affirmation of this election must be made by applicant in replying to this Office action.

Claims 13-16 are withdrawn from further consideration by the examiner, 37

CFR 1.142(b), as being drawn to a non-elected invention.

The following headings are required for a utility application under 37 CFR 1.77(b)

a) title of the invention,

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- b) cross-reference to related application,
- c) background of the invention,
- d) summary of the invention,
- g) **brief description of drawings**, and
- h) detailed description of the invention.

Appropriate corrections are required.

The disclosure is objected to because of the following informalities: on page 4, line 12, distillation column is depicted by number 3, whereas in Figure 1, distillation column designated as number 23.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fabian (USPN 4,478,621).

Applicant's claimed invention is directed to a process for producing carbon monoxide by cryogenic distillation in a two-stage process. First, the mixture of carbon monoxide, hydrogen and nitrogen is cooled and partially condensed to produce a gas enriched in hydrogen and a liquid enriched in carbon monoxide. The liquid enriched in carbon monoxide is then passed through a stripping column to produce liquid carbon monoxide low in hydrogen and gaseous carbon monoxide enriched in hydrogen. The low-hydrogen carbon monoxide is fractionated, a methane-rich stream is recovered first, a carbon monoxide-rich stream second, and nitrogen, possibly containing hydrogen is recovered from the head gases.

Fabian teaches a process for producing carbon monoxide by cryogenic distillation from the mixture comprising carbon monoxide, hydrogen and nitrogen. In this case, a gas stream rich in carbon monoxide, and containing 29.7 mole percent hydrogen, 4.2 mole percent nitrogen, 0.1 mole percent methane and 66 mole percent carbon monoxide, is fed into the system through line 31. This gas is fed into an open mixed refrigerant cooling cycle at 40, primarily containing hydrogen and carbon monoxide, and then compressed in compressor 41. The gas is then cooled to about 78° K in heat exchangers 42 and 43, thereby forming a carbon monoxide rich condensate, which is separated in separator 44. In order to degas dissolved hydrogen, the

condensate withdrawn from separator 44 through line 45 is expanded in valve 46 to about 1.5 bar, and then passed to another separator 47. See col. 8, lines 3-17.

The liquid phase from separator 47 consists of a carbon monoxide-nitrogen mixture. A partial stream of this liquid is withdrawn through line 48 and fed into the open cooling cycle. This cycle is also fed with expansion gas from the separator 47 through line 49, as well as by a partial stream 50 from the downflow 51 of expansion turbine 52, in which the hydrogen rich gas phase from separator 44 is expanded to provide the cooling requirements, after warming in heat exchangers 43 and 42. The gas mixture formed from lines 48, 49 and 50 thus represents a source of coolant, is present at very low temperatures, which is warmed against process streams which are thus to be cooled in heat exchangers 43 and 42, and then finally mixed with crude gas at 40. The principal liquid stream withdrawn from separator 47 is fed to pump 53 at a pressure of about 2.6 bar, fed to heat exchanger 43 through line 54, warmed, partially vaporized in heat exchanger 42, and fed through line 55 for expansion in nitrogen separator column 56. The overhead product from column 56 is the nitrogen fraction, which is withdrawn through line 57, and fed into residual gas line 58, which also carries the excess portion of the turbine downflow 51. Column 56 is heated by injecting a stream of cold carbon monoxide therein through line 59. This stream then leaves column 56 in liquid form with the carbon monoxide product stream, through line 60. See col. 8, lines 17-43, and Figure 2.

The difference between Fabian and the claimed invention is that the instant claims only utilize one separator, whereas the Fabian's process utilizes more than one

separator. However, such modification and variations are intended to be included within the scope of the invention and it is well within the purview of one ordinary skill in the art to modify the number of separators, in order to reduce the capital costs and still obtaining high purity of carbon monoxide.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fabian (DE 19541339).

Applicant's claimed invention is directed to a process for producing carbon monoxide by cryogenic distillation in a two-stage process. First, the mixture of carbon monoxide, hydrogen and nitrogen is cooled and partially condensed to produce a gas enriched in hydrogen and a liquid enriched in carbon monoxide. The liquid enriched in carbon monoxide is then passed through a stripping column to produce liquid carbon monoxide low in hydrogen and gaseous carbon monoxide enriched in hydrogen. The low-hydrogen carbon monoxide is fractionated, a methane-rich stream is recovered first, a carbon monoxide-rich stream second, and nitrogen, possibly containing hydrogen is recovered from the head gases.

Fabian teaches a process for producing carbon monoxide comprising:

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- (1) cooling and partial condensation of a hydrogen, carbon monoxide and methane mixture containing nitrogen,
- (2) withdrawal of 1<sup>st</sup> hydrogen-rich gaseous reaction,
- (3) charging of a H<sub>2</sub>-CO-CH<sub>4</sub>-N<sub>2</sub> condensate to a hydrogen stripping column,
- (4) separation of a 2<sup>nd</sup> hydrogen-rich fraction and carbon monoxide-rich fraction containing methane and nitrogen,
- (5) separation of the latter fraction in a 1<sup>st</sup> rectification column to obtain a nitrogen-rich fraction and carbon monoxide-rich fraction containing methane, and
- (6) charging of the latter fraction into a 2<sup>nd</sup> rectification column to obtain a high-purity carbon monoxide fraction and methane containing fraction. See abstract and Figure 1-3.

The difference between Fabian and the claimed invention is that the instant claims only utilize one rectification column, whereas the Fabian's process utilizes more than one rectification column. However, such modification and variations are intended to be included within the scope of the invention and it is well within the purview of one ordinary skill in the art to modify the number of rectification column, in order to reduce the capital costs and still obtaining high purity of carbon monoxide.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jafar Parsa whose telephone number is (571)272-0643. The examiner can normally be reached on 9 a.m.-5:30 p.m. (M-F).



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bonnie Eyler can be reached on 571-272-0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JP  
October 27, 2007

Jafar Parsa  
Primary Examiner  
Art Unit 1621



**J. PARSA**  
**PRIMARY EXAMINER**